So going back to basics, the mode of bending correction used on the x26-c mono is to apply a torque to one end of of a plate with the other end fixed. this make a liniar increse in angle from the fixed point to the end of the second crystal. the angle is discribed by. $\Delta\phi_{(x)} = (\frac{ML}{EI})x$ where $M = appliedTorque$ and $L = lengthofsecondcrystal$, I is thin plate initera as $I = \frac{1}{12}m(L^2 + w^2)$ and E is the Elastic modulous of Si . This gives a parabolic displacement by $\Delta y_{(x)} = \frac{Mx^2}{2EI}$

so that with a non zero corrective bend applied the reflecting condition of the second crystal is energy dependant. with $crystal1$ set at θ with the $Si[111]$ reflection selecting the energy by $\lambda = 2\frac{d}{[111]}\sin\theta$ and the second crystal selecting energy by $\lambda = 2\frac{d}{[\bar{1}\bar{1}\bar{1}]}\sin(\theta + \Delta\phi)$ since $\Delta\phi$ is set by $H/\tan\theta = x$ so that $\Delta\phi = (\frac{ML}{EI})H\frac{1}{\tan\theta}$ where H is the inter-crystal spacing.

$$\lambda = 2\frac{d}{[\bar{1}\bar{1}\bar{1}]}\sin(\theta + (\frac{ML}{EI})H\frac{1}{\tan\theta})$$

$$\lambda_2 = 2\frac{(d + \frac{-yLd}{EI}M)}{[\bar{1}\bar{1}\bar{1}]}\sin(\theta + \frac{[\frac{(\frac{H}{\tan\theta})^2 M}{2EI}] + H}{\tan\theta})$$

Using a caculated Corrective motion the scanning time to find the mamimim intensity for a given energy may be gratly redused. Because of indreict coupling of the motor motion to the bending moment arm, and motor slipage under load it is not posible to move directaly to the correct position by caculation. Through use of a simple strain gauge bonded to the non reflecting side of the second crystal closed feed back for corrective bending could be accomplished.

Thermal expansion will also play a role in observed intensity, as the first crystal heats it will begin to epand along a line at its middle where the beam falls on it. the expansion will cause an local increse in the firat crystals θ. and a translation further torwards the source point. both effects though relativly small will translate the reflection torwads $x = 0$ on the second crystal. which will reduse the $\Delta\phi$ if this reduction is faster than the local increse in θ on the first crystal the reflecting condition will be improved. if the local increse in θ on the first crystal is greater the error will be magnified.

I have no idea which mode dominates in this

There is also an error due to change in d spacing of the primary crystal it is governed by the Debye tempature factor.

$$2B = \frac{12h^2T}{m_a k\Theta_D^2}Q(\frac{\Theta_D}{T})$$

Look up the relation of 2B to D-spaceing, it should be in azsaroff

where the debye tempature is set by $\nu_m = (\frac{3N}{4\pi V})^{\frac{1}{3}} v_s$ and $\Theta_D = \frac{h\nu_m}{k}$ where N/V is the number density of atoms and v_s is the effective speed of sound in the solid

Thermal expansion is defined by $\alpha = \frac{\gamma C_V}{K_T V} = \frac{\gamma C_P}{K_S V}$ where γ is the heat capacity ratio, C_V is the heat capacity at constant volume, K_T is the isothermal bulk modulus, C_P is the heat capacity at constant pressure, and K_S is the adiabatic bulk modulus and V is the volume also $\alpha = 3\beta$ where β is the liniar expansion.

there is an other mode of change in the D-spaceing caused by the bend ing of the second crtystal. related to the radius of curverture ρ which deforms the latice to a larger D-space.

So for the second crystal